

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME



STANDING STOCKS OF FISHES
IN SECTIONS OF BIG GRIZZLY CREEK
PLUMAS COUNTY, 2000

by

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Central Valley Bay-Delta Branch

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INTRODUCTION

The Department of Water Resources (DWR) initiated an instream flow program in 1976 to identify streams that would benefit from flow enhancement, to assess instream values, and identify actions such as habitat manipulation that could enhance these streams. The Northern District of the DWR selected Big Grizzly Creek below Lake Davis (Figure 1) as one of the streams to study under this program.

Previous sampling on Big Grizzly Creek has been conducted by Department of Fish and Game (DFG) biologists. Initial estimates of rainbow trout (*Oncorhynchus mykiss*) populations were made by the DFG in 1976 (Brown 1976). The DFG also surveyed the creek in 1981, 1986, 1988, 1991, 1994, 1995, 1996, 1997, 1998, and 1999 to estimate standing stocks of brown trout (*Salmo trutta*) and rainbow trout in selected stations (Bumpass et al. 1989, Brown 1991a, Brown 1991b, Brown 1992, Brown 1995, Brown 1996, Brown 1997, Brown 1998, Brown 1999, and Brown 2000).

The purpose of this study is to evaluate the effects of the operation of Lake Davis on natural spawning populations of trout in Big Grizzly Creek through the periodic sampling of fish at established stations in that creek. These data may also be used to measure the recovery of the trout the DFG planted in Big Grizzly Creek following the rotenone treatment that was conducted in October 1998 to kill northern pike (*Esox lucius*) in Lake Davis.

The following species of fishes occur in Big Grizzly Creek: rainbow trout, brown trout, and Sacramento sucker (*Catostomus occidentalis*).

METHODS

Physical Measurements

Standing stocks of fishes were estimated at four stations in Big Grizzly Creek in September 2000 (Figure 1). Stations were intentionally selected to be near stations sampled in previous DFG studies (Gerstung 1973). Markers had previously been placed in trees along the stream to identify station boundaries. Stations varied in length from 48.5 to 114.9 m (Appendix 1). The length and width of each station was measured with metric tape measures.

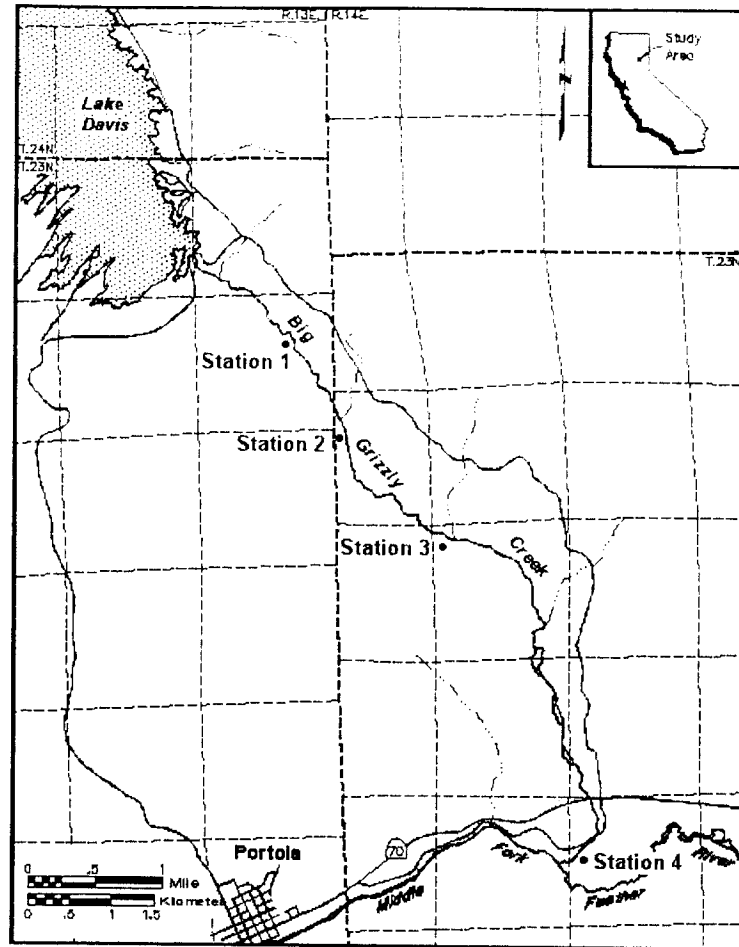


Figure 1 – Map of sampling stations in Big Grizzly Creek, Plumas County, 2000.

Biological Measurements

Fish were captured with a battery-powered backpack electroshocker in stream sections blocked by seines as described by Platts et al. (1983) (Figure 2). Captured fish were removed from the net-enclosed section on each pass. Standing stock estimates were developed using the two-count method of Seber and LeCren (1967) or the multiple-pass method of Leslie and Davis (1939) with limits of confidence computed using a formula proposed by DeLury (1951).

The weights of all trout were measured by displacement (Figure 3). Fork length (FL) of each fish caught was measured to the nearest millimeter.

Standing crops of rainbow and brown trout were calculated for individual stations where each species was caught and then combined for the entire creek. Age and growth and length-weight relationships were not calculated for brown trout or rainbow trout because most of our



Figure 2. Electrofishing in Big Grizzly Creek, Plumas County.



Figure 3. Measuring weights of trout by displacement.

catch was trout planted in 1999 by the DFG (Table 1). The distribution of all fish caught is listed according to location.

Table 1. Records of trout planted in Big Grizzly Creek by the DFG in 1999.

Species	Date	Average Length mm	Number of Fish
Rainbow trout	July 14	230	1020
Rainbow trout	July 15	74	4500
Rainbow trout	July 15	39	5496
Rainbow trout	August 6	55	1000
Rainbow trout	October 4	180	25
Brown trout	July 15	54	1000
Brown trout	August 3	280	1001
Brown trout	October 4	180	25

Distribution

Rainbow trout and brown trout were caught at each station. Sacramento suckers were caught in station 3. Largemouth bass were caught in station 4: the lowest station sampled (Table 2).

Table 2. Distribution of fishes in sections of Big Grizzly Creek, Plumas County, 2000.

	Station Number			
	1	2	3	4
Brown trout	X	X	X	X
Rainbow trout	X	X	X	X
Sacramento sucker			X	
Largemouth bass				X

Standing Crop

We found brown trout in all four stations. Biomass of brown trout was 3.9 g/m^2 (Table 3). Catchable brown trout biomass averaged 3.5 g/m^2 . Biomass of rainbow trout was 2.0 g/m^2 (Table 4). Catchable brown trout biomass averaged 1.8 g/m^2 . Biomass was not estimated for Sacramento suckers or largemouth bass.

Table 3. Estimates of brown trout standing crop in Big Grizzly Creek, Plumas County, 2000.

Distance below Grizzly Valley Dam (km)	Population Estimate	95 Percent Confidence Estimate	Biomass (g/m ²)	Estimate of Catchable Trout	Biomass of Catchable Trout (g/m ²)
1.8	7	7-8	2.2	7	2.2
3.1	5	5-8	3.6	5	3.6
5.2	10	10-13	5.2	3	4.7
10.4	80	79-83	4.5	11	3.4

Table 4. Estimates of rainbow trout standing crop in Big Grizzly Creek, Plumas County, 2000.

Distance below Grizzly Valley Dam (km)	Population Estimate	95 Percent Confidence Estimate	Biomass (g/m ²)	Estimate of Catchable Trout	Biomass of Catchable Trout (g/m ²)
1.8	37	37-37	3.0	12	2.6
3.1	25	22-34	3.0	11	2.6
5.2	7	7-7	1.7	6	1.7
10.4	14	14-16	0.3	3	0.2

DISCUSSION

Summer streamflow in Big Grizzly Creek has generally been between 0.6 and 0.3 cms from 1974 to 1999. Higher flows occurred in 1977 and 1979 (Table 5). The optimum flow for rainbow trout is 0.6 cms. That recommendation was based on an instream flow study that the DWR conducted in 1981 (Haines 1982). The DWR bases flow releases from Lake Davis on lake water levels in the spring. Lake water levels were low from 1988 through 1994 so minimum releases (0.3 cms) was the rule.

Table 5. Average summer streamflow in Big Grizzly Creek.
1974-2000.

Year	Flow (cms)	Year	Flow (cms)
1974	0.7	1988	0.3
1975	0.4	1989	0.3
1976	0.3	1990	0.3
1977	1.8	1991	0.3
1978	0.3	1992	0.3
1979	2.2	1993	0.3
1980	0.4	1994	0.3
1981	0.3	1995	0.6
1982	0.6	1996	0.6
1983	0.6	1997	0.6
1984	0.6	1998	0.6
1985	0.5	1999	0.6
1986	0.6	2000	0.6
1987	0.5		

Biomass of rainbow trout has averaged 2.8 g/m^2 and ranged from 0 to 7.3 g/m^2 since we began sampling in 1976 (Table 6). Biomass of brown trout has averaged 1.7 g/m^2 and ranged from 0 to 6.0 g/m^2 . Biomass for rainbow trout was below average in 2000 while brown trout biomass was slightly above average.

There is no significant correlation between streamflow and biomass for rainbow trout ($r^2 = 0.001$) because biomass was lower in 1995 than we expected from the relative high summer flows that were released that year. Brown trout biomass has averaged 1.9 g/m^2 and ranged from 0 to 6.0 g/m^2 . Brown trout biomass is also not correlated with flow ($p > 0.05$) due to low values in 1995 and 1996.

The catchable trout planted by the DFG in 1999 will need a few more years to fully stock the creek with their offspring. When the young produced by the planted trout reach maturity and spawn the creek should reach its carrying capacity for trout.

Table 6. Biomass of rainbow and brown trout in Big Grizzly Creek, 1976-2000.

	Rainbow Trout Biomass (g/m ²)	Brown Trout Biomass (g/m ²)
1976	1.9	0
1981	1.8	0.1
1986	3.2	3.8
1988	5.6	0.4
1994	2.2	0.7
1995	1.0	0.5
1996	4.5	0.5
1997	7.3	2.2
1998	1.6	3.1
1999	0	6.0
2000	2.0	1.8
Mean	2.8	1.7

LITERATURE CITED

- Brown C.J. 1976. Standing stocks of fishes in sections of Red Clover Creek. Little Last Chance, Big Grizzly, Last Chance, and Squaw Queen creeks, Plumas County, 1976. Calif. Dept. Fish and Game, 15 p.
- _____. 1991a. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1981. Calif. Dept. Fish and Game, 18 p.
- _____. 1991b. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1988. Calif. Dept. Fish and Game, 18 p.
- _____. 1992. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1991. Calif. Dept. Fish and Game, 21 p.
- _____. 1995. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1994. Calif. Dept. Fish and Game, 27 p.
- _____. 1996. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1995. Calif. Dept. Fish and Game, 22 p.
- _____. 1997. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1996. Calif. Dept. Fish and Game, 22 p.
- _____. 1998. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1997. Calif. Dept. Fish and Game, 22 p.
- _____. 1999. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1998. Calif. Dept. Fish and Game, 21 p.
- _____. 2000. Standing stocks of fishes in sections of Big Grizzly Creek, Plumas County, 1999. Calif. Dept. Fish and Game, 20 p.
- Bumpass, D.K., K. Smith, and C.J. Brown. 1989. Standing stocks of fishes in sections of Big Grizzly and Little Last Chance creeks, Plumas County, 1986. Calif. Dept. Fish and Game, 36 p.
- DeLury, D.B. 1951. On the planning of experiments for the estimation of fish populations. J. Fish. Res. Bd. Canada. 8:281-307.
- Gerstung, E.R. 1973. Fish populations and yield estimates from California streams. Cal-Neva Wildlife 9-19.
- Haines, S.L. 1982. Upper Feather River flow study. Calif. Dept. Water Resources. 35 p.

Leslie, P.H., and D.H.S. Davis. 1939. An attempt to determine the absolute number of rats in a given area. *J. Animal Ecology*. 8:94-113.

Platts, W.S., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. Gen. Tech. Rep. INT-138. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experimental Station; 1983. 70p.

Seber, G.A.F., and E.D. LeCren. 1967. Estimating population parameters from catches large relative to the population. *J. Animal Ecology*. 36(3):631-643.

APPENDIX 1

PERMANENT FISH POPULATION STATIONS FOR BIG GRIZZLY CREEK, PLUMAS COUNTY SEPTEMBER, 2000

Station 1 (Stream Gage Station) - Station 1 is located 1.8 stream km below Grizzly Valley Dam and just downstream from an abandoned USGS stream gage at an elevation of 1622 m MSL. The station begins at a concrete weir near a stream gage (UTM 170 167). The stream within the station is a riffle (67%) with several split channels and small pocket pools that ends in a long, shallow pool (33%). It is 63.4 m long and has a surface area of 409.7 m² at 0.56 cms. Substrate is 75% boulders, 15% rubble, and 10% sand.

Station 2 (IFN Station) - Station 2 is 3.1 stream km below Grizzly Valley Dam. The site located at UTM 176 156 at an elevation of 1610 m MSL. The upper end of the station is a steep rapid (55%) followed by two deep pools (45%) separated by short rapids. The substrate is mostly rubble (60%), boulder (20%), gravel (10%), with areas of sand (10%) in the pools. The station is 48.5 m long with a surface area of 186.1 m² at 0.56 cms.

Station 3 (3-Mile Station) - Station 3 is located 5.2 km downstream from Grizzly Valley Dam at an elevation of 1549 m MSL at UTM 189 141. The station begins in a steep rapid followed by more gradual rapids (75%) with pocket pools and two larger pools (25%) near the lower end. Substrate is boulder (65%), rubble (20%), sand (10%), and gravel (5%). The station is 57.9 m long and has a surface area of 270.1 m² at 0.56 cms.

Station 4 (6-Mile Station) - Station 4 is located 10.4 km below Grizzly Valley Dam and 0.2 km above the confluence with the Middle Fork Feather River at an elevation of 1488 m MSL. It is located at UTM 205 106. The station begins in a rapid just above a large 0.7 m deep pool (33%) followed by several riffle areas (67%) and shallow pools with undercut banks and overhanging grass clumps. Substrate is rubble (10%), gravel (75%), bedrock (10%), and mud (5%). The station is 114.9 m long with a surface area of 563.9 m² at 0.56 cms.

APPENDIX 2

LENGTH AND WEIGHT OF BROWN TROUT CAUGHT IN BIG GRIZZLY CREEK, 2000.

FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT
60	3	76	6	88	8	113	19
61	3	76	5	88	9	115	18
62	2	76	4	89	7	116	17
63	2	76	4	89	8	120	19
65	3	77	6	89	7	165	43
65	4	77	5	89	8	174	65
66	3	77	5	90	8	179	45
67	4	79	7	90	9	185	75
67	3	79	5	90	9	194	111
67	4	79	5	90	9	196	82
67	4	80	6	91	10	203	87
68	3	80	6	91	9	210	100
69	4	81	6	91	8	211	95
69	4	81	7	93	8	212	109
70	4	81	6	93	9	213	98
70	4	81	7	93	10	213	92
72	4	82	6	94	10	215	110
72	5	82	5	94	10	235	137
72	5	83	7	94	10	243	157
73	5	83	6	95	9	251	290
73	5	84	7	96	9	256	184
73	4	84	7	97	9	260	184
73	6	84	6	103	12	266	200
74	4	84	5	104	13	275	217
74	4	85	7	104	13	276	210
75	5	85	7	105	11	358	540
75	4	86	8	105	15	399	720
75	5	86	7	108	16		
75	5	87	7	113	19		
76	6	88	8	113	17		

APPENDIX 3

LENGTH AND WEIGHT OF RAINBOW TROUT CAUGHT IN BIG GRIZZLY CREEK, 2000.

FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT	FORK LENGTH	WEIGHT
56	3	77	5	99	12	168	50
61	3	78	6	109	15	170	62
62	4	78	6	120	21	171	61
63	3	78	6	121	21	179	69
63	3	78	6	129	73	183	63
64	3	80	6	134	28	184	66
65	3	80	6	140	33	184	61
66	4	80	8	143	32	187	72
66	3	80	7	144	39	191	89
67	2	81	8	146	32	231	157
67	4	82	6	147	33	249	144
68	4	84	7	147	34	331	390
68	4	84	7	147	38		
69	4	84	6	148	35		
69	5	85	6	150	39		
69	5	86	8	152	40		
69	4	87	7	154	43		
70	6	87	9	154	51		
70	5	89	8	156	51		
71	5	90	9	157	49		
72	6	93	9	163	43		
73	4	97	10	164	47		